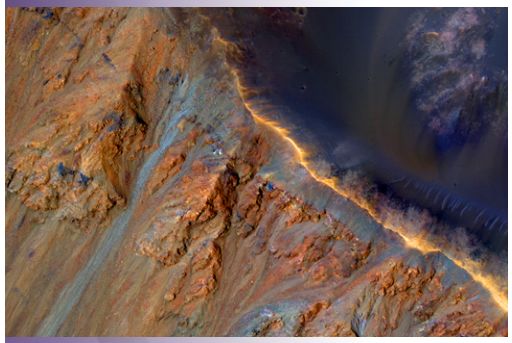
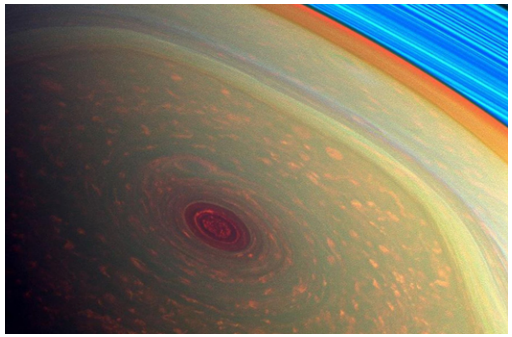
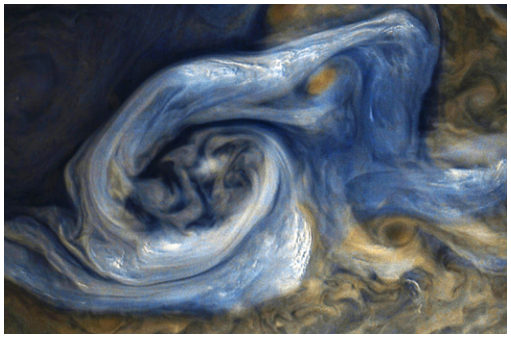
SCIENCE

National Aeronautics and Space Administration


PLANETARY SCIENCE DIVISION
Research & Analysis

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July 2, 2018

Research & Analysis Program Outline

- Program Updates
- Templates
- Program Due Dates (ROSES 2017 & 2018)
- NESSF Update
- Selection Stats
- Speed of Money
- Keyword Analysis
- NASA's response to PAC R&A Recommendations

General R&A Updates

ROSES 2018 released on Feb 14, 2018

ECF – Still developing framework but plan to amend new program into ROSES 2018

Facilities Update – New CAN for Facilities on hold:

- NASA has requested a National Academies study; *ad hoc* committee is working: Sample Analysis Future Investment Strategy

National Academies Study on R&A Restructuring

- Report completed https://www.nap.edu/catalog/24759/review-of-the-restructured-research-and-analysis-programs-of-nasas-planetary-science-division

Archiving manuscripts – new policy for all NASA funded work to be put into PubSpace (part of PubMed)

https://www.nasa.gov/open/researchaccess/pubspace

General R&A Update

- Language added to many ROSES 2018 calls to emphasize the Moon
  - Expecting a significant increase in proposal pressure across all programs
- New Scientific Exploration Subsurface Access Mechanism for Europa (SESAME) technology development program element released in ROSES 2018
- NASA encourages experts in all fields to commit to supporting our peer-review process either as panelists or external reviewers
  - Volunteer at: https://science.nasa.gov/researchers/volunteer-review-panels
  - Or, when contacted by a program officer, consider joining the Team

C.17 Planetary Major Equipment and Facilities (PMEF)

- Replaces the former Planetary Major Equipment (PME) program element
- PMEF requests may still be APPENDED to full research proposals in the same program elements as before
  - But, only for Investigator Instruments, not Facility Instruments
- STAND-ALONE proposals may still be made for both Investigator and (all) Facility Instruments
  - But, there is now a **single deadline** for all such proposals (Step 1: July 17; Step 2: Sept. 17)
  - Step 1s will either be invited to submit Step 2 or declined
  - PI does **not** have to be current PI
  - Open to same programs as before, plus ISFM and XRP
- Minimum budget raised from $40k to $50k

Lunar Discovery and Exploration Program

SSERVI CAN3 – draft released on 6/12/18

ROSES

- Apollo Next Generation Sample Analysis Program (ANGSA) – Program element released and NOIs already received
- SSW, EW, PDART, PSTAR, SSO – lunar proposals encouraged (lunar proposals are also encouraged in LDAP, of course)
- DALI – Development and Advancement of Lunar Instrumentation – 48 Step-2 proposals received
  - Lunar instruments that support NASA's broader lunar exploration goals, including human exploration and in situ resource utilization (ISRU), as well as lunar science.
  - Particularly instruments for small stationary landers.
  - Technologies that will reach at least TRL 6 by end of grant, flight hardware builds for landers with flight opportunities as early as ~2021.

Developing archive system for lunar (and other) sample data, and digitizing lunar curation data

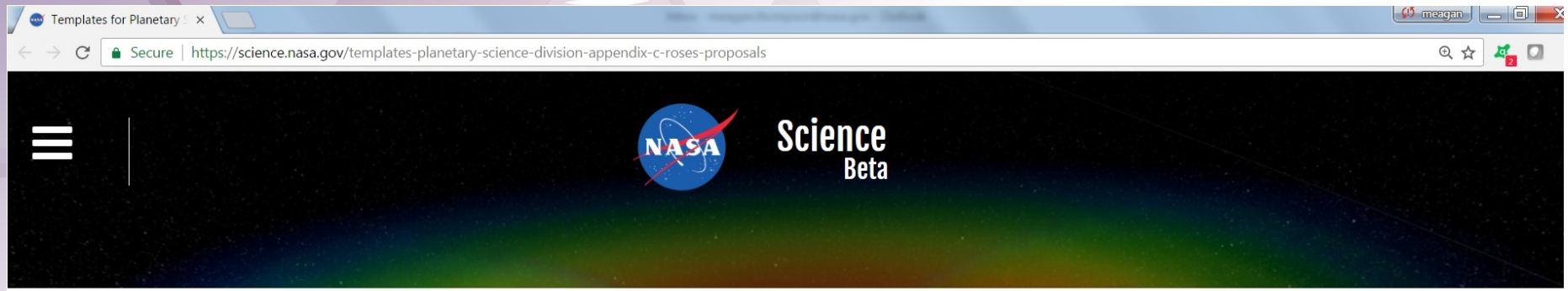
CubeSats

- Current: LunaH-Map, HEOMD cubesats
- Future: SIMPLEx SALMON3-PEA– call is open to all INCLUDING Lunar proposals – Draft PEA is out

Korean Pathfinder Lunar Orbiter Participating Scientist Program

- Launch 12/2020

LRO continues to operate and provide excellent data for future missions



Templates for Planetary Science Division (Appendix C) ROSES proposals

Updated Templates for both Data Management Plan and Table of Work Effort.

- Microsoft Word
- LaTeX

https://science.nasa.gov/templates-planetary-science-division-appendix-c-roses-proposals

ROSES 17 Due Dates

Program Name	Step-1 Due Date	Step-2 Due Date
Exoplanets (XRP)	***03/30/2017***	***05/25/2017***
Emerging Worlds (EW)	***03/30/2017***	***06/01/2017***
Cassini Data Analysis (CDAPS)	***04/06/2017***	***06/08/2017***
Solar System Obs. (SSO)	***04/06/2017***	***06/08/2017***
Laboratory Analysis of Returned Sample (LARS)	***04/26/2017***	***06/29/2017***
Planetary Data Archiving, Restoration, Tools (PDART)	***05/11/2017***	***07/12/2017***
OSIRIS REx Participating Scientist Program (ORPSP)	***05/04/2017***	***07/25/2017***
Planetary Protection Research (PPR)	***06/27/2017***	***09/28/2017***
Planetary Sci./Tech. Through Analog Research (PSTAR)	***07/25/2017***	***10/10/2017***
Exobiology (EXOB)	***08/17/2017***	***10/24/2017***
Mars Data Analysis (MDAP)	***08/24/2017***	***10/26/2017***
PICASSO	***09/22/2017***	***11/16/2017***
Discovery Data Analysis (DDAP)	***09/21/2017***	***11/21/2017***
Rosetta Data Analysis Program (RDAP)	***09/21/2017***	***11/21/2017***
Habitable Worlds (HW)	***11/16/2017***	***01/17/2018***
Solar System Workings (SSW)	***11/16/2017***	***02/22/2018***
Lunar Data Analysis (LDAP)	***11/30/2017***	***03/01/2018***
New Frontiers Data Analysis Program (NFDAP)	***Moved to ROSES18***	

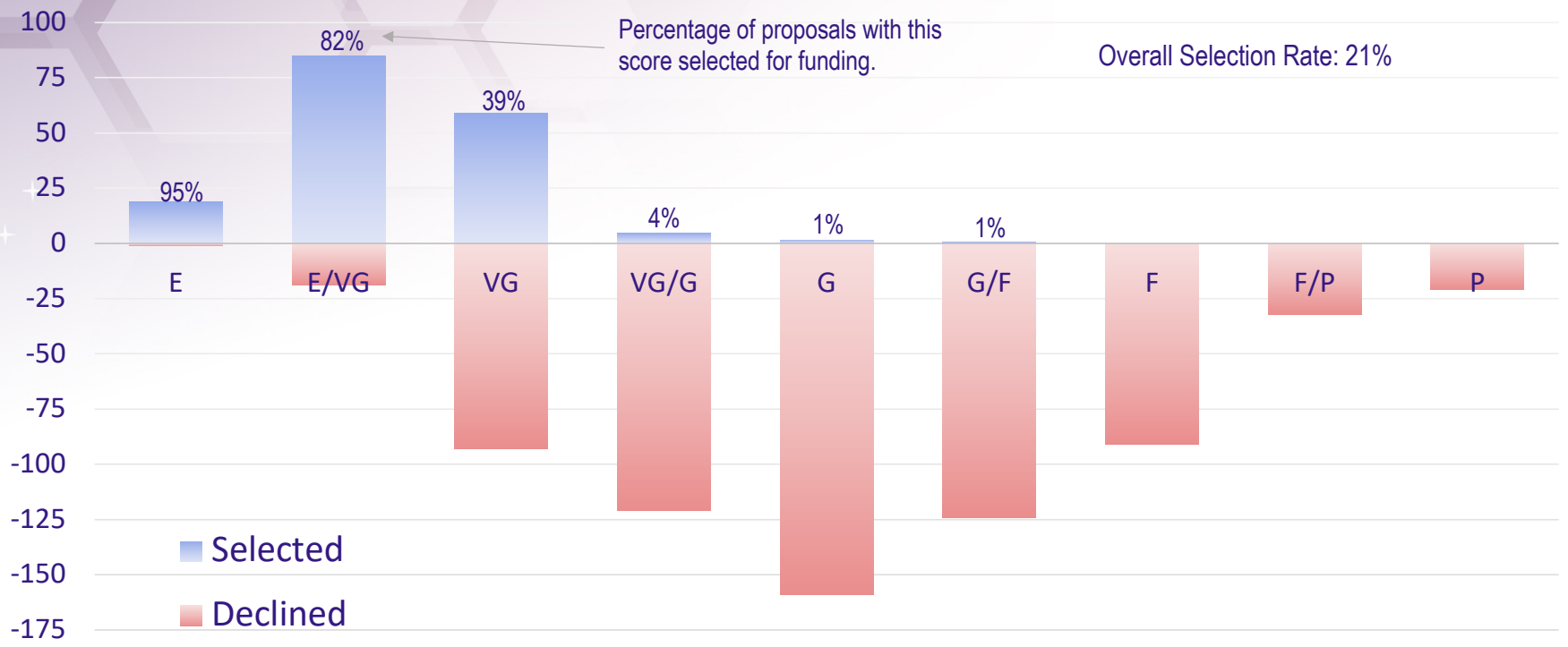
ROSES 18 Due Dates

Program Name	Step-1 Due Date	Step-2 Due Date
Juno PSP	***03/01/2018***	***04/26/2018***
Exobiology (EXOB)	***04/16/2018****	***05/24/2018***
Exoplanets (XRP)	***03/29/2018***	***05/30/2018***
Emerging Worlds (EW)	***04/12/2018***	***06/01/2018***
Development & Advance of Lunar Instruments (DALI)	***04/03/2018***	***06/05/2018***
Solar System Obs. (SSO)	***04/05/2018***	***06/07/2018***
MatISSE	***04/18/2018***	***06/20/2018***
Laboratory Analysis of Returned Sample (LARS)	***04/26/2018***	***06/28/2018***
Planetary Data Archiving, Restoration, Tools (PDART)	***05/10/2018***	07/12/2018
Cassini Data Analysis (CDAP)	***06/01/2018***	08/01/2018
New Frontiers Data Analysis Program (NFDAP)	***06/12/2018***	08/23/2018
Planetary Major Equipment/Facilities (PMEF)	07/17/2018	09/17/2018
Planetary Sci./Tech. Through Analog Research (PSTAR)	07/25/2018	10/10/2018
Mars Data Analysis (MDAP)	08/23/2018	10/25/2018
Discovery Data Analysis (DDAP)	08/30/2018	11/01/2018
Rosetta Data Analysis Program (RDAP)	08/30/2018	11/01/2018
PICASSO	09/20/2018	11/20/2018
Habitable Worlds (HW)	11/15/2018	01/17/2019
Solar System Workings (SSW)	11/15/2018*	01/31/2019
Lunar Data Analysis (LDAP)	11/29/2018	02/28/2019

NESSF Changes

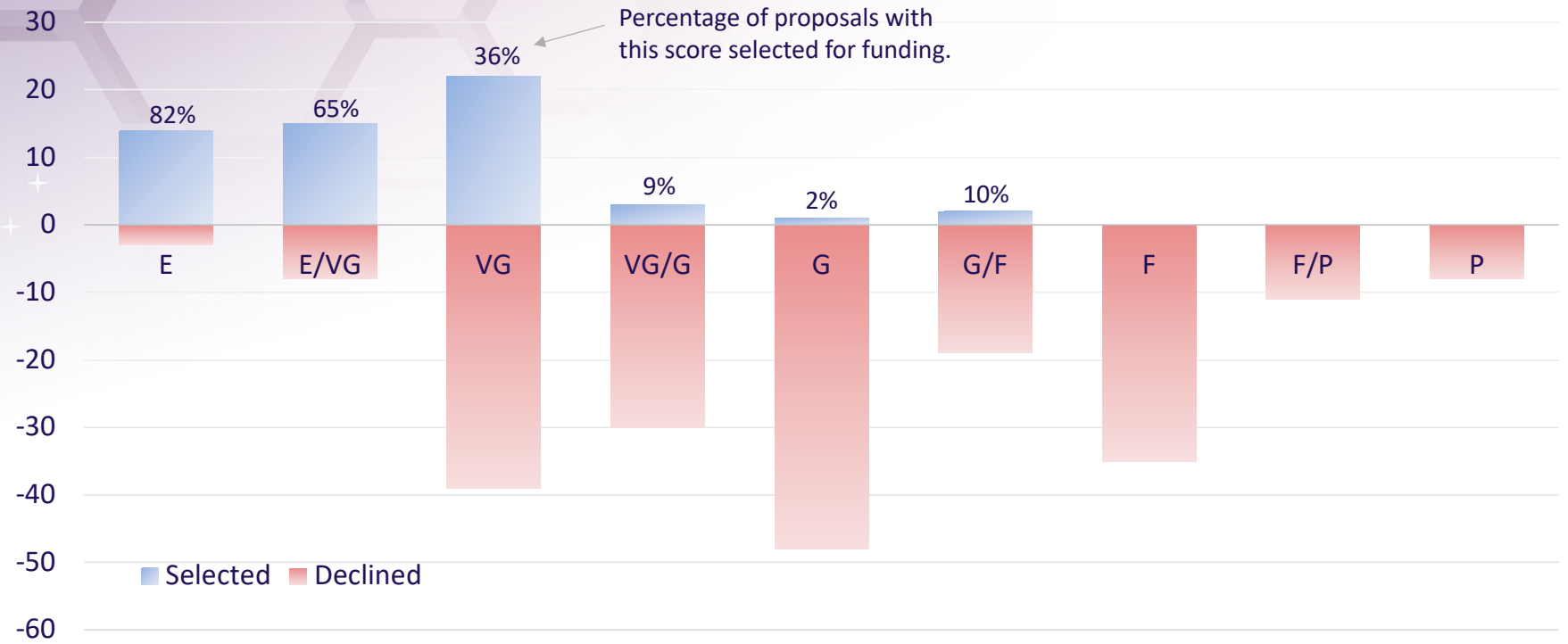
- Award amount increased to $45K. ($35K stipend + $10K for travel to conferences and seminars, health insurance policy, books, tuition and fees, etc.)
- New award amount more in line with other graduate research fellowships, NASA will be able to compete for the best students
- Change went into effect for ROSES17, and impacts existing renewal NESSF awards
- Overall budgets did not change

PSD R&A Selections – ROSES 2016



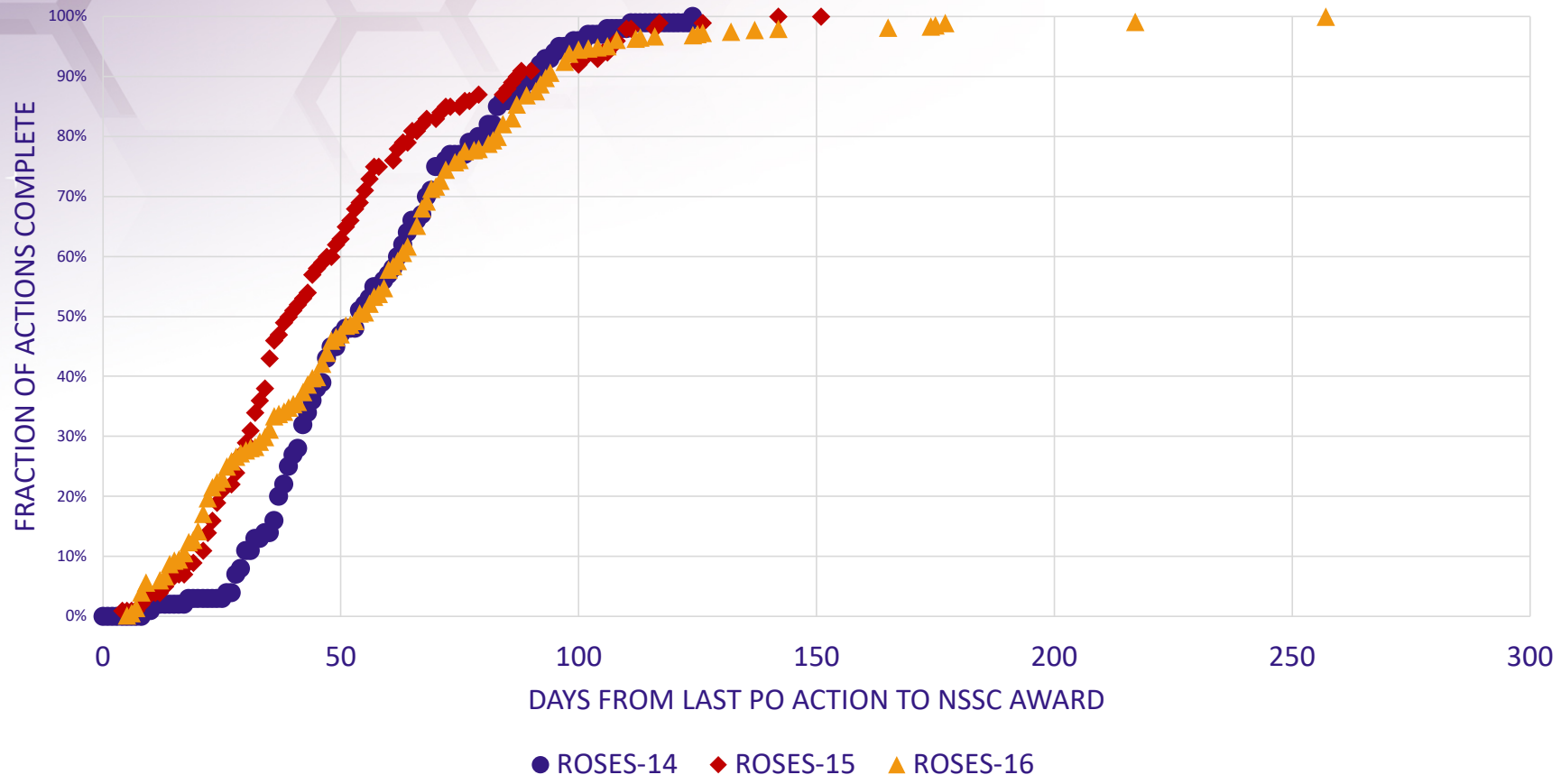
For proposals submitted to ROSES 2016, including all core programs (EW, SSW, HW, SSO, EXO) and all DAPs (MDAP, DDAP, LDAP, CDAPS).

PSD R&A Technology Selections – ROSES 2016



For technology proposals submitted to ROSES 2016, including MatISSE, PICASSO, COLDTech, HOTTech. The awards below VG/G reflect descopes/proof of concept studies that were not re-voted, hence scores remain low

Speed of Money



Keyword Analysis

Analysis of keyword distribution, 2012-2016 for categories:

- Type of Task (keyword category 1)
- Object(s) of Study (keyword category 2)
- Science Discipline (keyword category 3)

Analysis includes:

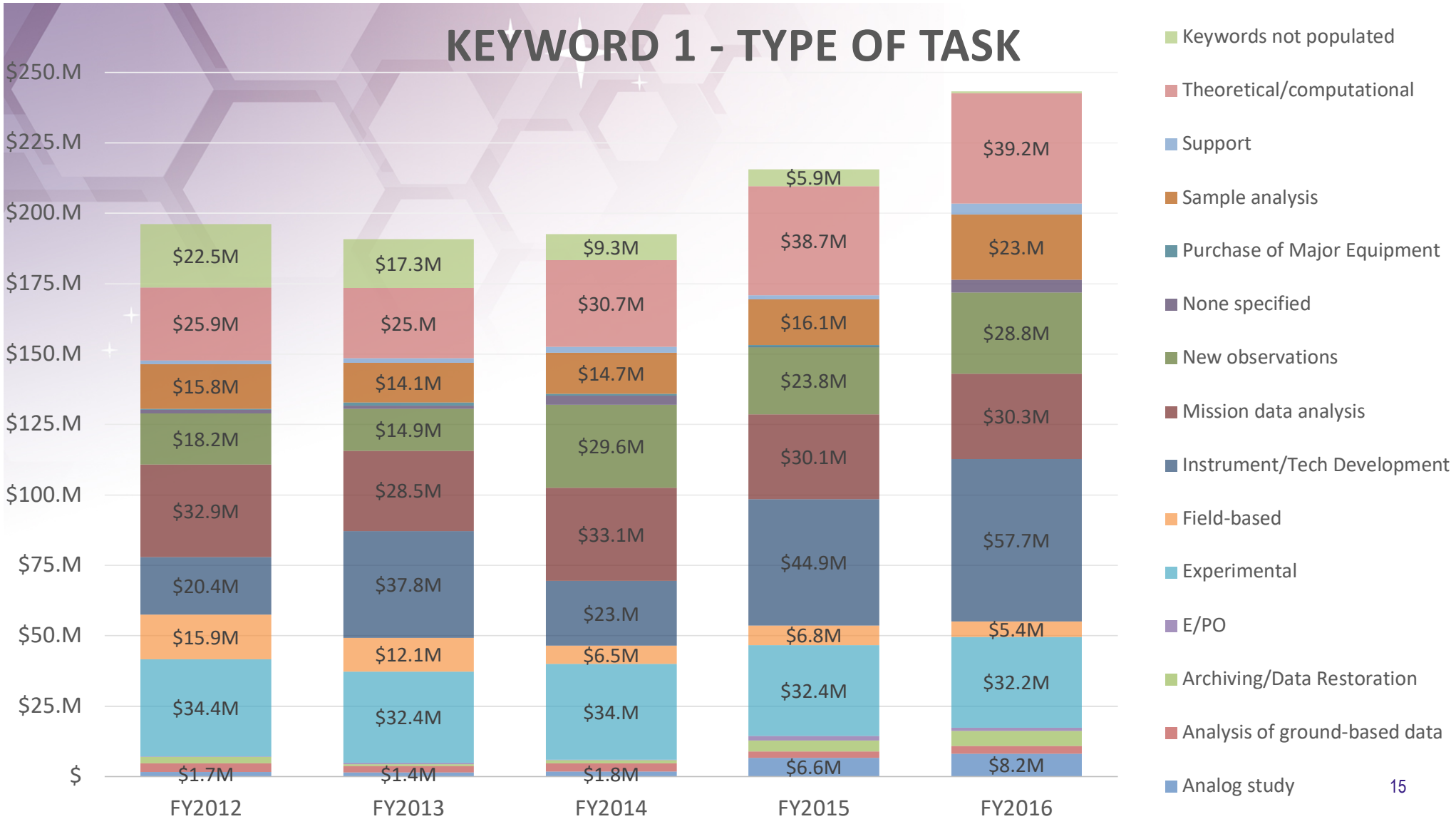
- R&A awards, including NAI CAN awards
- Data Analysis Programs
- Participating Scientist and Guest Investigator Programs

Analysis excludes:

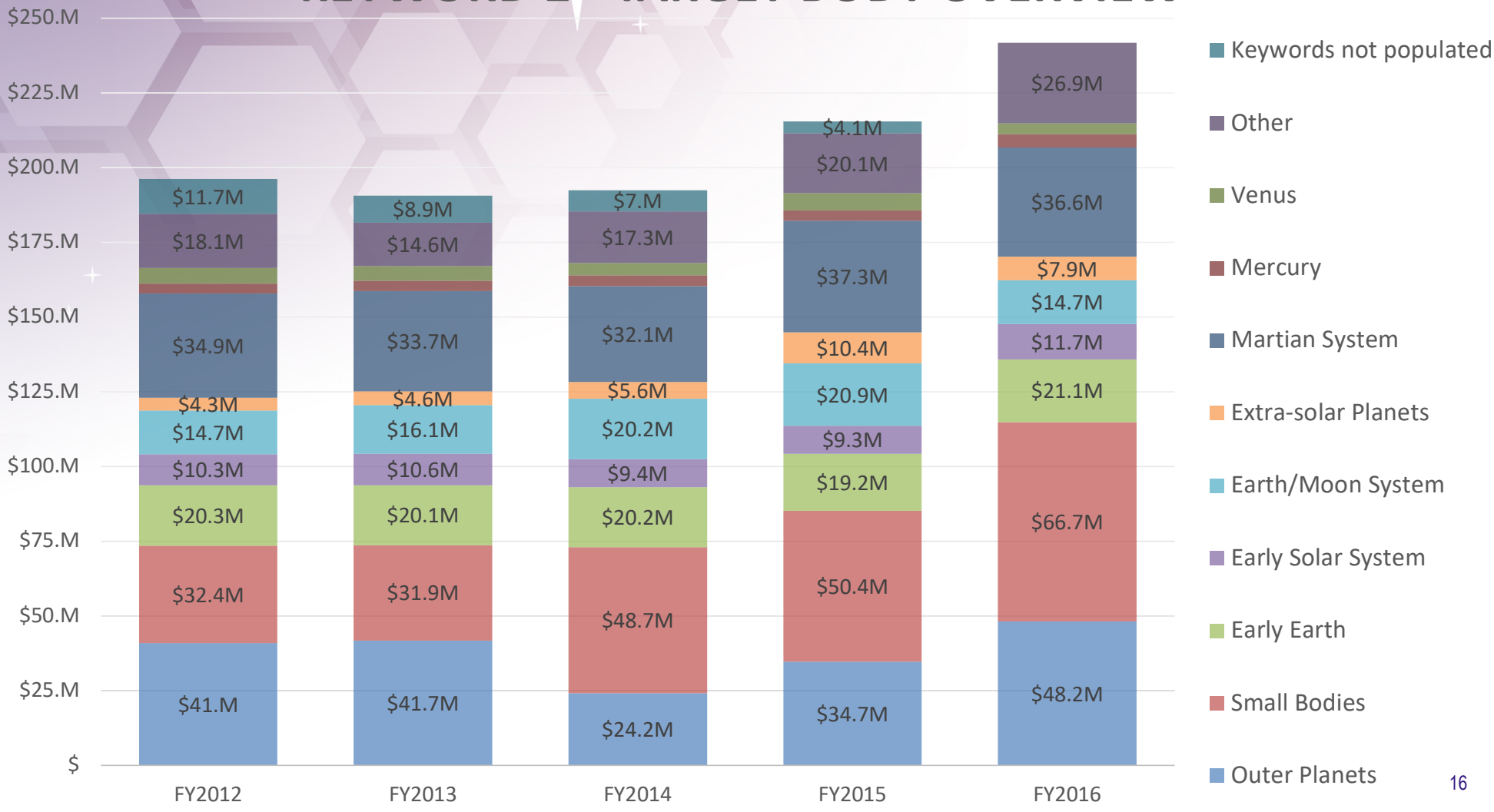
- Support activities
- Facilities (e.g. RPIFs, AVGR, GEER, PAL, RELAB, …)

Caveats

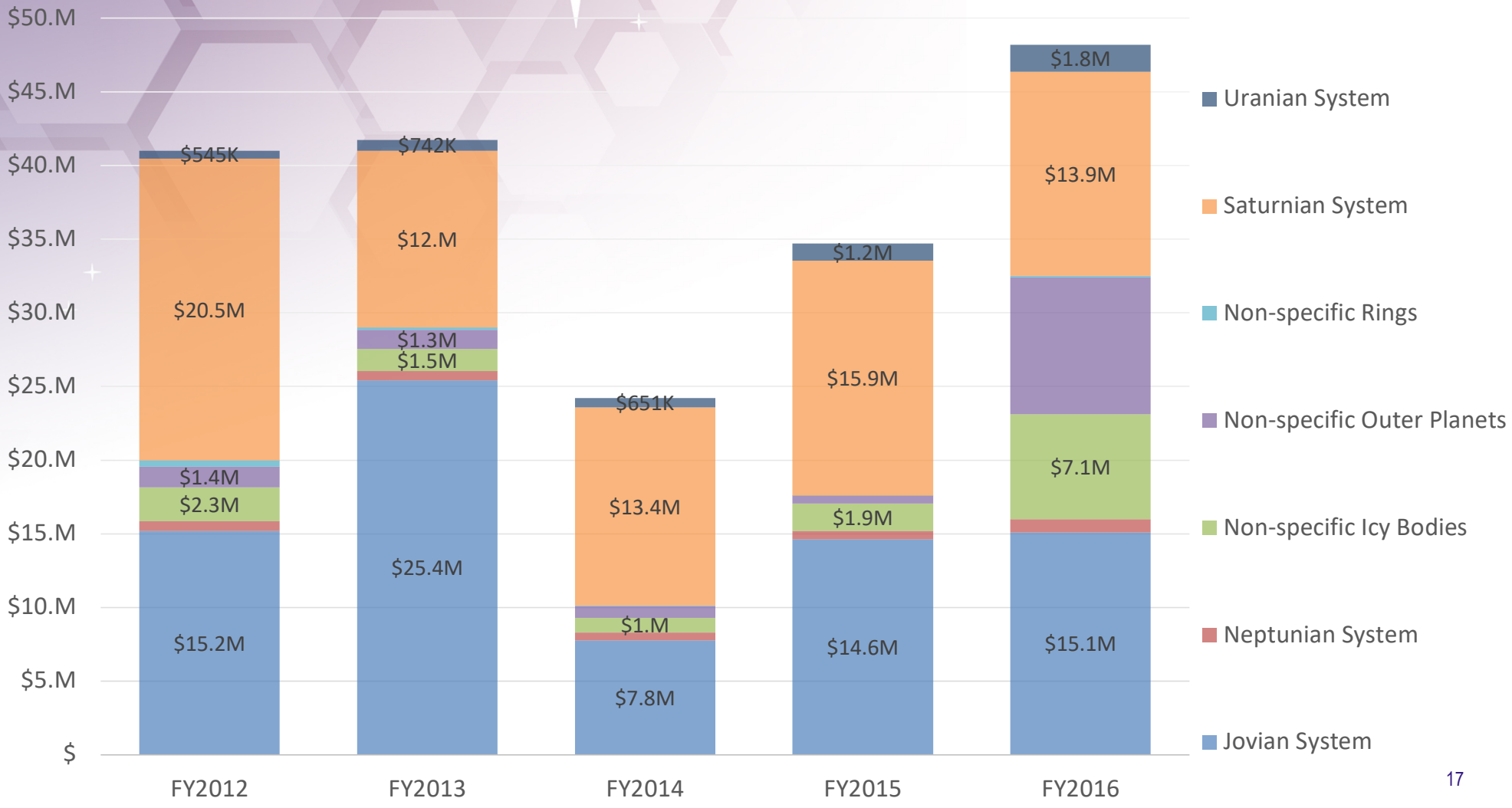
- If more than one keyword was used within any category, approved amount was equally divided between keywords
- Return rate varied from year to year, portfolio to portfolio, and keyword category to keyword category
- Keywords might have been used inconsistently between program officers


KEYWORD 1 - TYPE OF TASK
$250.M
$225.M
$200.M
$175.M
$150.M
$125.M
$100.M
$75.M
$50.M
$25.M
$
FY2012
$22.5M
$25.9M
$15.8M
$18.2M
$32.9M
$20.4M
$15.9M
$34.4M
$1.7M
FY2013
$17.3M
$25.M
$14.1M
$14.9M
$28.5M
$37.8M
$12.1M
$32.4M
$1.4M
FY2014
$9.3M
$30.7M
$14.7M
$29.6M
$33.1M
$23.M
$6.5M
$34.M
$1.8M
FY2015
$5.9M
$38.7M
$16.1M
$23.8M
$30.1M
$44.9M
$6.8M
$32.4M
$6.6M
FY2016
$39.2M
$23.M
$28.8M
$30.3M
$57.7M
$5.4M
$32.2M
$8.2M
Keywords not populated
Theoretical/computational
Support
Sample analysis
Purchase of Major Equipment
None specified
New observations
Mission data analysis
Instrument/Tech Development
Field-based
Experimental
E/PO
Archiving/Data Restoration
Analysis of ground-based data
Analog study

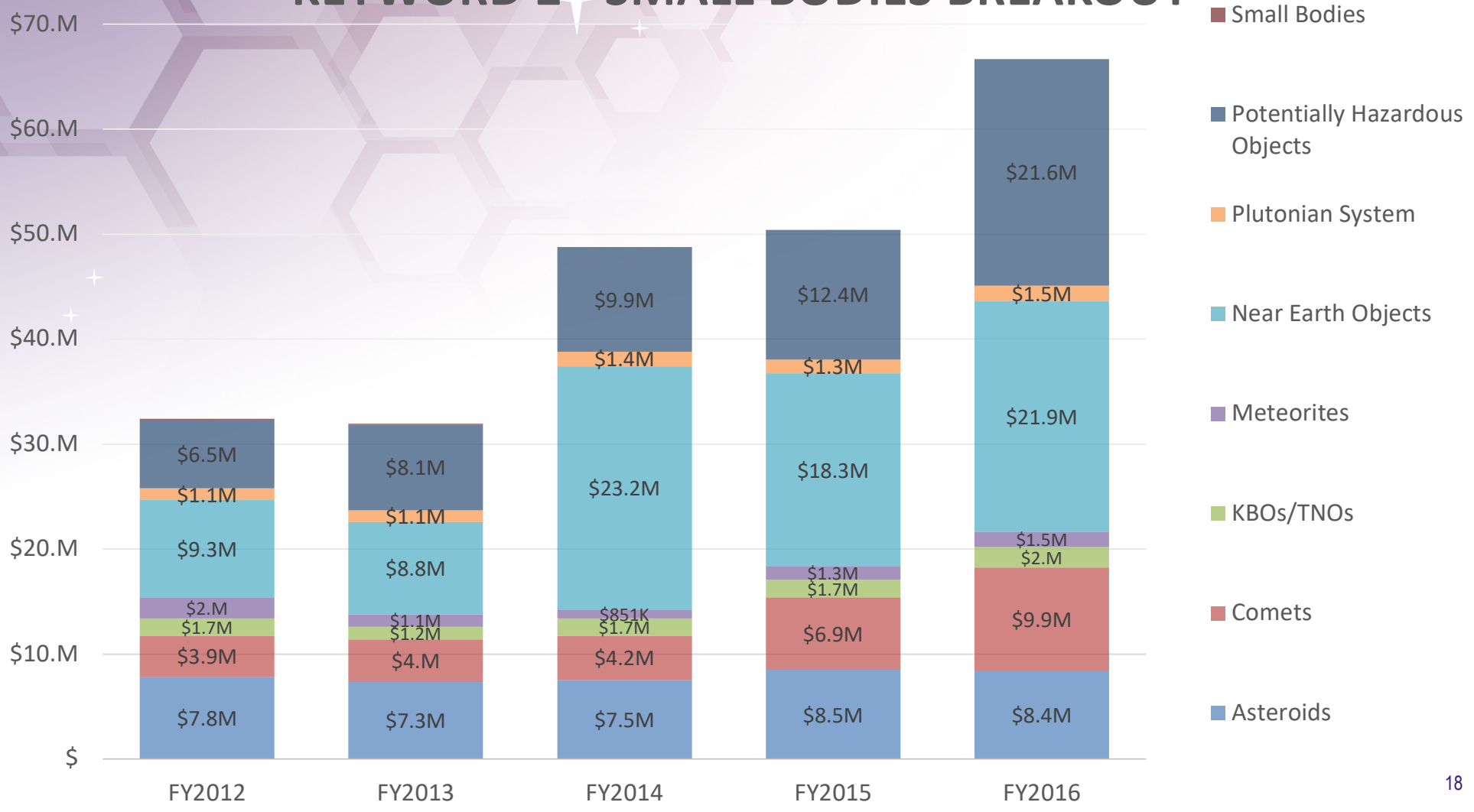
KEYWORD 2 - TARGET BODY OVERVIEW



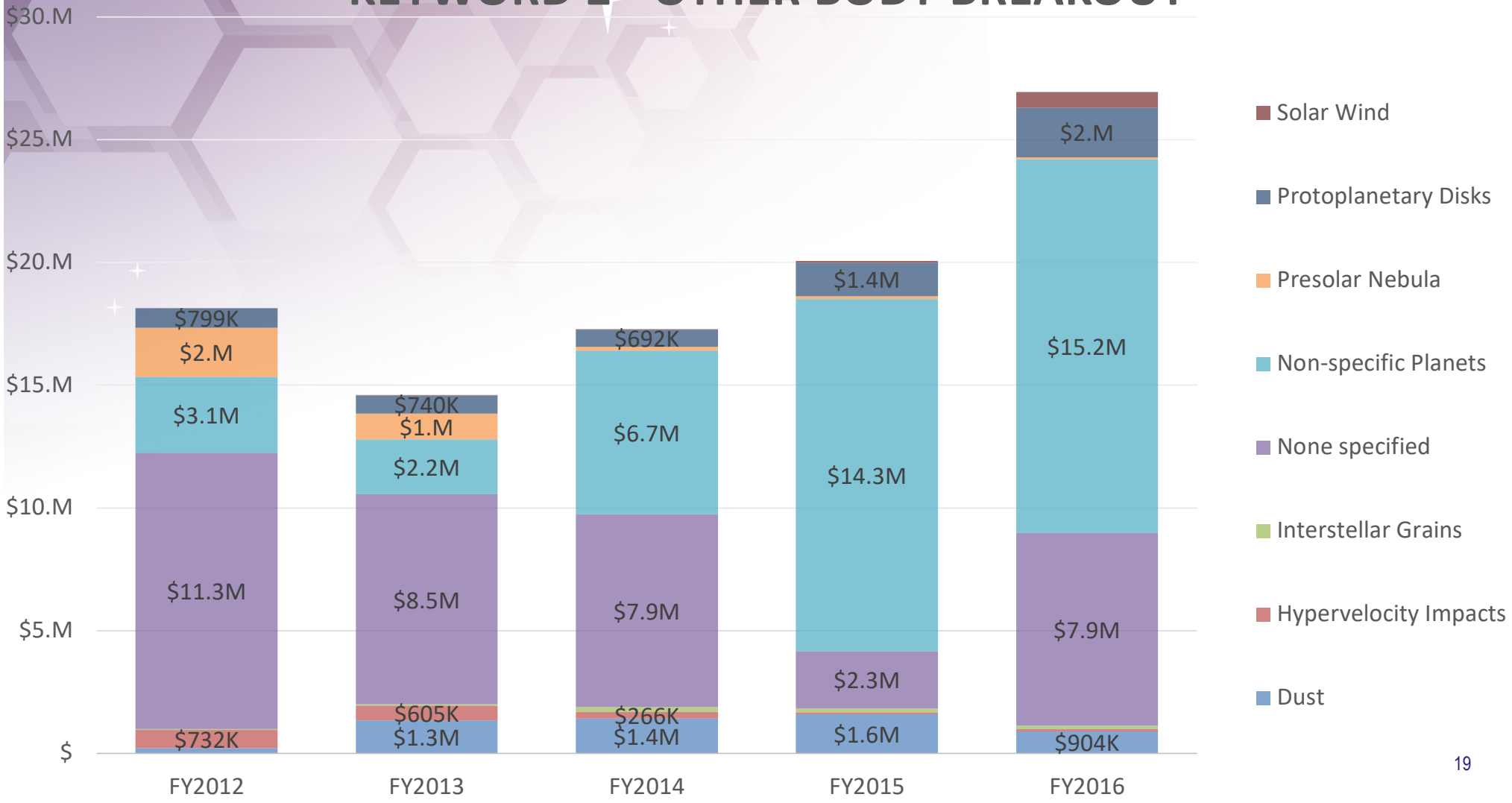
KEYWORD 2 - OUTER PLANETS BREAKOUT



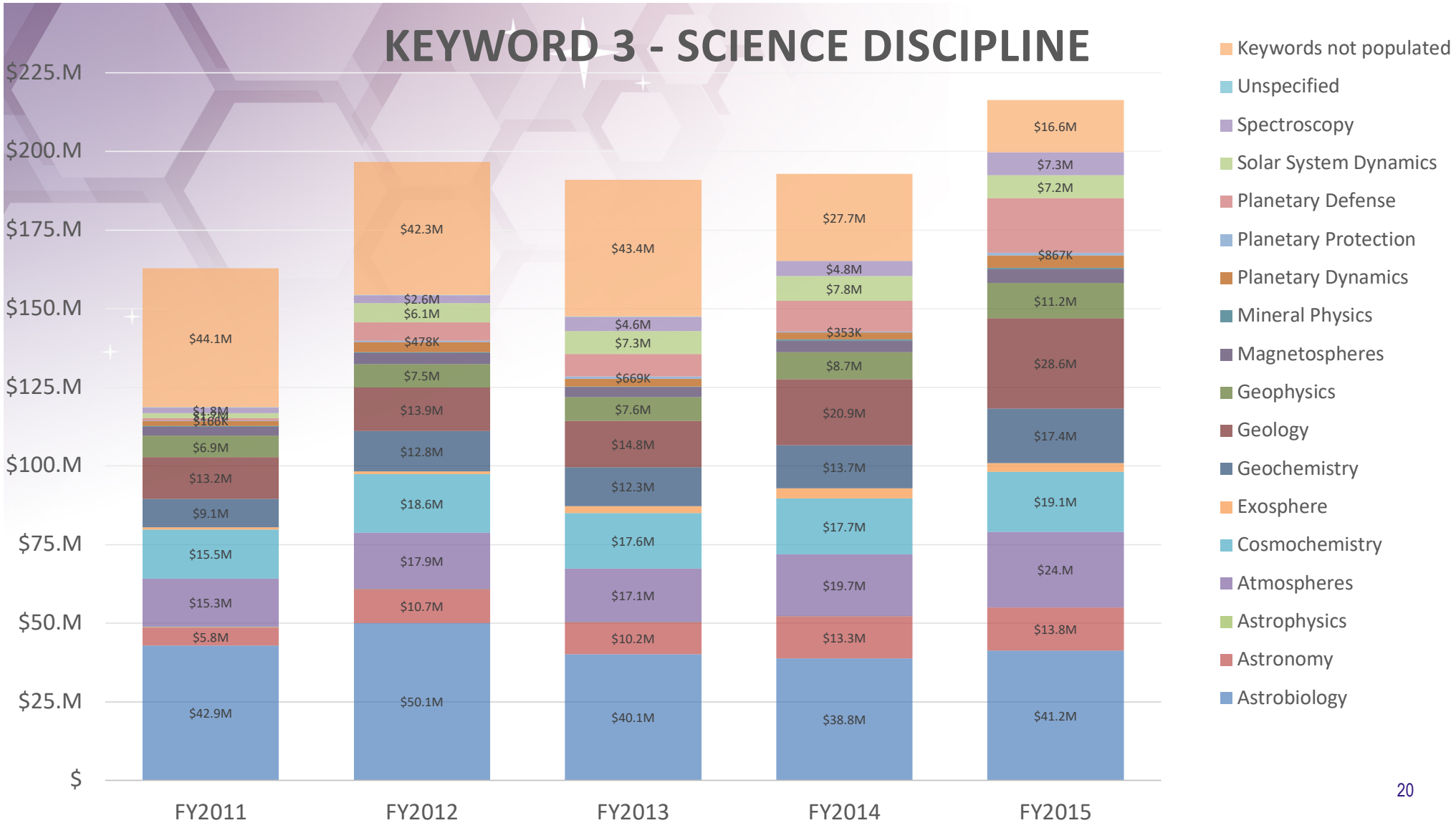
KEYWORD 2 - SMALL BODIES BREAKOUT



KEYWORD 2 - OTHER BODY BREAKOUT



KEYWORD 3 - SCIENCE DISCIPLINE



PAC Recommendations from March 21-23, 2018

NSPIRES External Reviews – R&A

External reviews play a vital role in ensuring fair and diverse proposal selections by allowing program officers to cast a wider net among the research community for reviewers. Ensuring an adequate supply of external reviews enables participation of reviewers who may be unable to travel yet can supply needed expertise, particularly for interdisciplinary areas. A key step in obtaining thorough and complete external reviews is to ensure that reviewers have adequate time to write their reviews. External review quality can be addressed through making the following suggested improvements.

PAC Recommendations

- PAC recommends that external reviewers must be notified within 48 hours that they have been officially selected as a reviewer.
- PAC recommends that NSPIRES be modified to provide automated notifications to external reviewers whenever any review is assigned.
- PAC recommends that NSPIRES be modified such that all panelists who have completed their reviews can see all external reviews as soon as they are completed.
- PAC recommends that NSPIRES be modified such that group chiefs can always see the status of all reviews for the panel (i.e., accept/decline, not logged in, in progress, completed).

NASA's Early Career Fellowship (ECF) Program - R&A

- The NASA Early Career Fellowship (ECF) Program was created to help early career planetary scientists acquire their first faculty position. The ECF Program was not solicited in ROSES 2017 and the New Early Career Fellowship Program is TBD in ROSES 2018. At the National Science Foundation (NSF), the CAREER program is intended to enhance the promotion case of junior faculty to fully tenured positions.

- PAC recommends the revision and restoration of NASA's ECF Program. PAC recommends dividing the way the ECF program is administered for tenure-track (or tenure-track equivalent) and non-tenure track researchers. For early career planetary scientists that do not yet have a tenure-track or tenure-track equivalent position, the ECF could be modeled after NASA's Postdoctoral Program awards or Hubble Fellowships. For those that already have faculty positions, the NSF's CAREER program could be the model for those that are on the tenure track or have tenure-equivalent positions.

Standardization of Planetary Data Formats and Definitions – R&A

- The use of standard data formats ensures data interoperability, reduces redundant efforts, and can maximize the scientific return from planetary spacecraft missions.
- PAC recommends that NASA make a concerted effort to facilitate the development of standard formats and definitions for planetary data (i.e. Geographic Information System (GIS) and spatial data).

Questions?

Backup slides

SMD's response to the National Academies Review of the Restructured R&A Programs of NASA's Planetary Science Division

On the use of "external" reviewers in peer reviews

Recommendation 1: In conducting scientific peer reviews of research proposals, NASA's Planetary Science Division should **engage the services of several (at least two or three) external (mail) reviewers well in advance** of panel reviews. These reviews are critical to a fair and effective proposal evaluation process, particularly when the review panels have a more interdisciplinary character. The panel chair and group chiefs, if recruited early, can take the lead in identification of appropriate external reviewers. (Additional details may be found in section "Proposal Submission and Review" in Chapter 2.)

Response 1: NASA concurs with the recommendation. It is indeed current Planetary Science Division practice to **request multiple external reviews** for each proposal in addition to the individual panel reviews. PSD will work more closely with its community to **ensure** that this occurs and **the external reviewers have sufficient time** to deliver a complete and in-depth review for their assigned proposals. However, as demonstrated in Dr. Rall's presentation to the *ad hoc* committee on May 12, 2016, although the **restructured programs are more interdisciplinary** than the old ones, the **subpanels are more focused** as there are more proposals in any given subtopic from which to construct these subpanels. Moreover, the response rate to requests for external reviews varies quite widely between programs and can drop below 20%. Finally, **the depth and rigor of external reviews often falls well below the quality expected.** In the future, PSD intends to **explore methods of improving the response rate and quality of external reviews**.

On the reconsideration of proposal selection decisions

Recommendation 2: NASA's Planetary Science Division should expeditiously complete **establishment of the process for reconsideration of proposal selection decisions**, develop and implement a **formal mechanism to track debriefing and reconsideration requests** across program elements, and inform the community about the process. More transparency in this area can provide the planetary science community with greater confidence that NASA has appropriate checks and balances in the selection process. (Additional details may be found in the section "Proposal Decision Reconsideration" in Chapter 2.)

Response 2: NASA concurs with the recommendation. The Planetary Science Division has now fully implemented the new, restructured programs and a **revision to the SMD Policy Document 09 (SPD 09)** ***Requesting Reconsideration of NRA Proposal Declination*** is underway. This revision will include a **formal mechanism to track reconsideration requests** not just across Planetary Science Division programs but across all SMD programs.

On the solicitation, evaluation, and selection of high-risk/high-impact research

Recommendation 3: NASA needs to **investigate appropriate mechanisms to ensure that high-risk/high-payoff** fundamental research and advanced technology-development activities **receive appropriate consideration during the review process**. (Additional details may be found in the section "High-Risk/High-Payoff Research Activities and Advanced Technology" in Chapter 3.)

Response 3: NASA concurs with this recommendation. The Planetary Science Division is working with the Science Mission Directorate's front office on a directorate-wide assessment of whether the SMD R&A program has an effective process in place to most effectively solicit, review and select evolutionary vs. revolutionary projects, *i.e.,* high-impact but speculative work vs. more gradual work in which there is high confidence that it will succeed. The goal is to assess if the **current practice of soliciting by topic and evaluation for merit** followed by **flagging high-risk/high-impact projects for the selection official is adequate**, or should SMD consider other practices. **PSD will work with its Advisory Committee to develop functional definitions of "High Risk" and "High Payoff"** and then apply them to assess the adequacy of current practices of solicitation, evaluation & selection. **In addition, SMD and the Division Directors have tasked the NAC Science Committee and the four science advisory committees to provide NASA with advice in this area.**

On the alignment of R&A program structure and funding with the Planetary Science Division's science goals

Recommendation 4: A formal assessment by NASA of **how well the program structure and funding are aligned with the Planetary Science Division's science goals** should be conducted at least **every 5 years**, appropriately phased to the cycle of decadal surveys and midterm reviews. (Additional details may be found in the section "Funding Distribution Among Program Elements" in Chapter 3).

Response 4: NASA concurs with this recommendation. We charge our **advisory committee** to **conduct an annual review of our accomplishments against the Planetary Science Division's science goals** through the annual Government Performance and Results Act/Modernization Act **(GPRAMA) report**. This report is reviewed and graded by the division's advisory committee (formerly the Planetary Science Subcommittee (PSS) of the NASA Advisory Council, now replaced by the Planetary Science Advisory Committee (PAC)). Further, **the NASA Science Plan is typically updated every three to four years** and while the planetary science goals and objectives are durable and do not change significantly, that does **provide an opportunity to tweak the R&A structure or change priorities**. We do not ask our advisory committee to comment on the alignment of the R&A program structure or funding against these science goals, though. **It is NASA's intention to include an assessment of this alignment in the charge to the next decadal survey committee**.

On the efficacy with which the current R&A program supports existing and future missions

Recommendation 5: NASA should support the **development of the technologies required to return astrobiological and cryogenic samples to Earth and the appropriate containment, curation, and characterization facilities** consistent with the Planetary Science Division's science goals and planetary protection requirements. (Additional details may be found in the section "Enable New Spaceflight Missions" in Chapter 4).

Response 5: NASA concurs with this recommendation. The **Planetary Science Division has investments in various instrument development and technology programs** such as are MatISSE (Maturation of Instruments for Solar System Exploration) and PICASSO (Planetary Instrument Concepts for Advancement of Solar System Observations), for both high and low technology readiness levels, respectively. Program elements also exist for the **development of instrument technology for future New Frontiers missions** (Homesteader), **future astrobiological instrumentation for Europa and other ocean world missions** (COLDTech – Concepts for Ocean worlds Life Detection Technology), **missions to study the interiors of the gas giants and the surface of Venus and Mercury** (HOTTech – Hot Operating Temperature Technology), planetary studies through **emerging platforms such as CubeSats** (SIMPLEx – Small, Innovative Missions for Planetary Explorations; PSDS3 – Planetary Science Deep Space SmallSat Studies), and **research activities in extreme environments on Earth** (PSTAR – Planetary Science & Technology through Analog Research). The Planetary Science Division will continue to **work closely with the Astromaterials Curation Facility** to upgrade existing curation facilities and develop new ones as needed. Additionally, the **Planetary Science Division will investigate establishing a new program to solicit development of spacecraft technology for the return of cryogenic and astrobiological samples**.

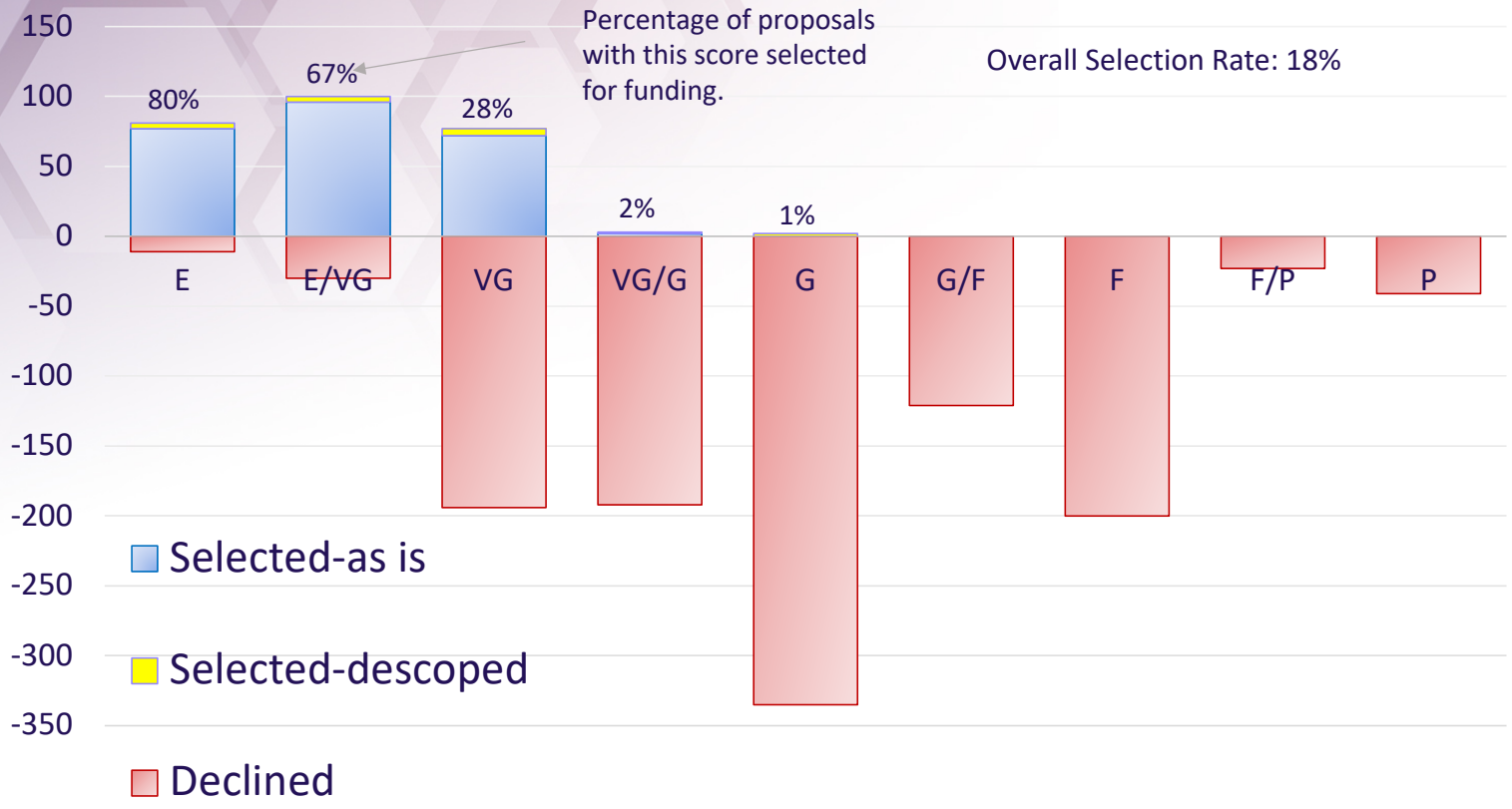
On sustaining critical scientific and technical expertise

Recommendation 6: In making funding decisions for the various research and analysis program elements, NASA **should consider the need to sustain critical scientific and technical expertise and the instrumental and facility capabilities required for scientific return on future missions**, as discussed in the 2011 planetary science decadal survey. (Additional details may be found in the section "Enable New Spaceflight Missions" in Chapter 4.)

Response 6: NASA concurs with this recommendation. In the coming decades, NASA and its international partners will develop and operate an **increasing number of sample return missions** (*e.g.,* Hayabusa-2, OSIRIS-REx, Mars Sample Return, Martian Moons eXploration). In order to be fully and adequately prepared for this future, PSD has acknowledged that information is needed to **understand the planetary community's laboratory capabilities and challenges, and to define the magnitude of the stress on research and training needs**. In preparation for the next Decadal Survey in Planetary Science, **NASA requested that the National Academies of Science perform a study addressing the following questions**:

1. **What laboratory analytical capabilities are required** to support PSD (and partner) analysis and curation of existing and future extraterrestrial samples?
   a. **Which of these capabilities currently exist, and where are they located** (including international partner facilities)?
   b. **What existing capabilities are not currently accessible** that are/will be needed?
2. Whether the **current sample laboratory support infrastructure and NASA's investment strategy meets the analytical requirements** in support of current and future decadal planetary missions.
3. How can NASA ensure that the **science community can stay abreast of evolving techniques and be at the forefront of sample analysis**?

PSD R&A SELECTIONS – ROSES 2015



Metrics for proposals submitted to ROSES 2015, including all core programs (EW, SSW, HW, SSO, EXO) and all DAPs (MDAP, DDAP, LDAP, CDAPS).

PSD R&A Selections – ROSES 2014

Working Definitions

High-Impact: Research whose outcome, if confirmed, would have a substantial and measureable effect on current thinking, methods or practice.

High-Risk: Research that tests novel and significant hypotheses for which there is scant precedent or preliminary data or that are counter to the existing scientific consensus.

Are these definitions good enough to start with?
How can they be improved?

- **Multidisciplinary:** Research in which contributions from two or more different disciplines *are independently or sequentially* applied, *providing additive contributions* to the solution of a common problem.
- **Interdisciplinary:** Research in which contributions from two or more different disciplines are *jointly applied, providing interactive contributions* to the solution of a common problem.

Interdivisional: Research that simultaneously advances the strategic objectives of more than one SMD Division. Such research may be multi- or inter-disciplinary but need not be.

The ACs will be asked to improve these definitions, if they see fit to do so.